# ABSTRACT

The present study is concerned with the bio-reduction of Chicken Feathers and production of keratinase by *Bacillus sp* strain FBN-4 isolated from poultry feed waste industry of Okara by submerged fermentation technique. Shake flask cultivation conditions were optimized for keratinase production by *Bacillus sp* FBN-4 was achieved. The fermentation media was composed of 0.5% Chicken feathers, 0.5% yeast extract, and 0.1% $K_2HPO_4$, 0.05% inorganic salts such as, $MgSO_4$, NaCl, and $CaCl_2$ for maximum degradation and keratinase production. It was observed the temperature had a remarkable effect on degradation and keratinase production. The optimum temperature for the bio degradation and maximum keratinase production was 37°C and it was observed that the degradation of feathers and production of keratinase decreased significantly with any change in temperature from 37°C.

The influence of inoculum size and age was also studied. The maximum keratinase production was observed at 4% (v/v) of inoculum (153.48±3.2 K.U/ml) and by inoculum, which was made from 24 hours old slant (177.07±2.36 K.U/ml) at pH 7.0 in the cultural medium. Effect of different concentrations of salts ($K_2HPO_4$, $MgSO_4$, NaCl, and $CaCl_2$) on production and activity of keratinase was studied in growth medium. The highest keratinase activity was shown by 0.5% of $K_2HPO_4$ (94.29±2.15 K.U/ml), 5ml of $MgSO_4$ (141.89±0.43 K.U/ml), 4ml of $CaCl_2$ (106.36±2.52 K.U/ml) and by 2ml of NaCl (166.16±1.72 K.U/ml).

For the characterization purpose of keratinase enzyme the effect of pH, temperature and incubation time were studied. This indicated that the keratinase enzyme was stable at 60°C up to 90 min and highly active at pH 10.0.

The degradation of Chicken feathers was also studied in up flow reactor with 10 grams of feathers in one liter of the medium. The maximum degradation of chicken feathers was achieved (5.7 grams).